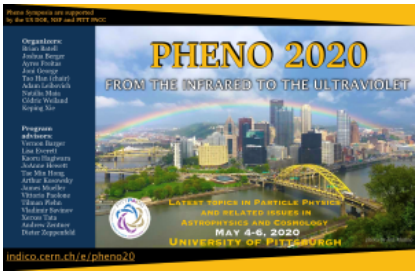

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Asteroid-Mass Primordial Black Holes as Dark Matter

Tuesday 5 May 2020 14:30 (15 minutes)

Microlensing of stars places significant constraints on sub-planetary mass compact objects, including primordial black holes, as dark matter candidates. However, when the Einstein radius of the lens in the source plane is smaller than the size of the light source, amplification is strongly suppressed, making it difficult to constrain lenses with a mass below ˜10ˆ-10 solar masses, i.e. asteroid-mass objects. Previous constraints, using Subaru HSC observations of M31, assume a fixed source size of one solar radius. We correct the HSC constraints by constructing a source size distribution based on the M31 PHAT survey and on a synthetic stellar catalogue, and by correspondingly calculating the finite-size source effects. We find that the actual HSC constraints are weaker by up to almost three orders of magnitude in some cases, broadening the range of masses for which primordial black holes can be the totality of the cosmological dark matter by almost one order of magnitude.

Summary

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